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ABSTRACT

This workbook is intended as a guide for the homeowner in taking steps to reduce home energy costs. It allows the homeowner to identify procedures applicable to his/her home and then implement those procedures most cost-effective for the particular situation. It provides methods for estimating savings in home heating and cooling costs by taking prescribed measures. (Author/RE)

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ED 137156

Home Energy Savers' Workbook

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Home Energy Savers' Workbook

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Introduction

Homeowners, like other consumers, are often victims of a lack of information. It is sometimes difficult to determine how serious a problem a malfunctioning furnace, termites, or faulty plumbing might be—and consequently, how much a homeowner should invest to correct such problems.

In the same way, it is also difficult to determine how much insulation is cost-effective, how good an investment storm windows are, etc.

This workbook will help you determine what measures will make your home more energy efficient, and what you can expect to save in home heating and cooling costs by taking these measures.

Everyone's home is different. The simple procedures described in this workbook will allow you as much as possible to consider the unique features of your home. However, the savings you calculate may not be precise since many of the energy-saving measures are dependent upon how thermally efficient your home is already. Not all of these simple procedures take this into account. The calculations should, however, give you a good feel for the amount of money and energy you could save on your fuel bills.

Utility bills will continue to increase, but the rise in your personal bills will be less if you make judicious home improvements for energy conservation. You might think of such improvements as a hedge against inflation. The cost of making these improvements may well increase the value of your home. And, at current fuel prices, these improvements can pay for themselves many times over the life of the house.

This workbook is meant as a guide to show you what steps you can take to reduce your home energy costs, and how to carry out those steps that appear to be most cost-effective.

Test Your Energy Quotient

Lower Your Energy Bills

Most of the money you pay for gas or oil—and sometimes for electricity—is for the energy required to heat and cool your home to make it more comfortable. You don't need to be reminded how fast the price of this energy is rising. And as fuel supplies dwindle, the price can be expected to rise even faster.

A 20 to 30 percent reduction in your heating and cooling bills would be a welcome sight. But, since the cost of energy isn't likely to come down, the only way to save that 20 to 30 percent is to use the energy you buy more efficiently. This workbook tells you how.

Five Ways to Cut Energy Use

Inside, you'll find five simple ways to cut your heating and cooling costs with a minimum of time and expenditure, and without affecting your comfort.

How much you actually save will, of course, depend on the condition of your house and how much you are spending for energy right now. But as you go through the workbook, you'll find out how to calculate how much you're likely to save—before you ever spend a dime! How many of these five ways are for you? To find out, test your "energy quotient" on the following short quiz.

A Quick Quiz

Score

1. What is Your Thermostat Setting?

If your thermostat is set at 68°F. or less during daytime in winter, score 6 points; 5 points for 69°; 4 points for 70°. If your thermostat is set above 70°, score 0. ___

If you have whole-house air conditioning and you keep your temperature at 78°F. in the summer, score 5 points; 4 points for 77°; 3 points for 76°. If you have no air conditioning, score 7 points. If your thermostat is set below 76°, score 0. ___

In winter, if you set your thermostat back to 60°F. or less at night, score 10 points; 9 points for 61°; 8 points for 62°; 7 points for 63°; 6 points for 64°; 5 points for 65°. If your thermostat is set above 65° at night, score 0. ___

2. Is Your House Drafty?

To check for drafts, hold a flame (candle or match) about 1 inch from where windows and doors meet their frames.

If the flame doesn't move, there is no draft around your windows, and you score 10 points. If the flame moves, score 0. ___

If there is no draft around your doors, add 5 points. If there is a draft, score 0. ___

If you have a fireplace and keep the damper closed or block the air flow when it is not in use, add 4 points. ___

If you do not have a fireplace, add 4 points. ___

If you leave the damper open when the fireplace is not being used, score 0. ___

Score

3. How Well is Your Attic Insulated?

Check the map (p.3) to determine the inches of ceiling insulation recommended for your zone.

If you already have the recommended thickness of insulation, score 30 points. ___

If you have 2 inches less insulation than you should, score 25 points. ___

If you have 4 inches less insulation than you should, score 15 points. ___

If you have 6 inches less than you should, score 5 points. ___

If you have less than 2 inches of insulation in your attic, score 0. ___

4. Is Your Floor Insulated?

If you have unheated space under your house and there is insulation under your floor, add 10 points; if there is no insulation, score 0. ___

If you have a heated or air conditioned basement or if there is no space under your house, score 10. ___

5. Do You Have Storm Windows?

If you live in an area where the temperature frequently falls below 30°F. in winter and you use storm windows, score 20 points. If you do not have storm windows, score 0. ___

Your Energy Quotient: Total ___

How Well Did You Do?

How Well Did You Do?

90 or above: Congratulations! You are already an energy saver. By keeping your home well-insulated and draft-free, you are using energy more efficiently than 80 percent of your neighbors, based on the national average.

If you would like to save even more money on your energy bills, you may want to consider the suggestions at the end of this workbook.

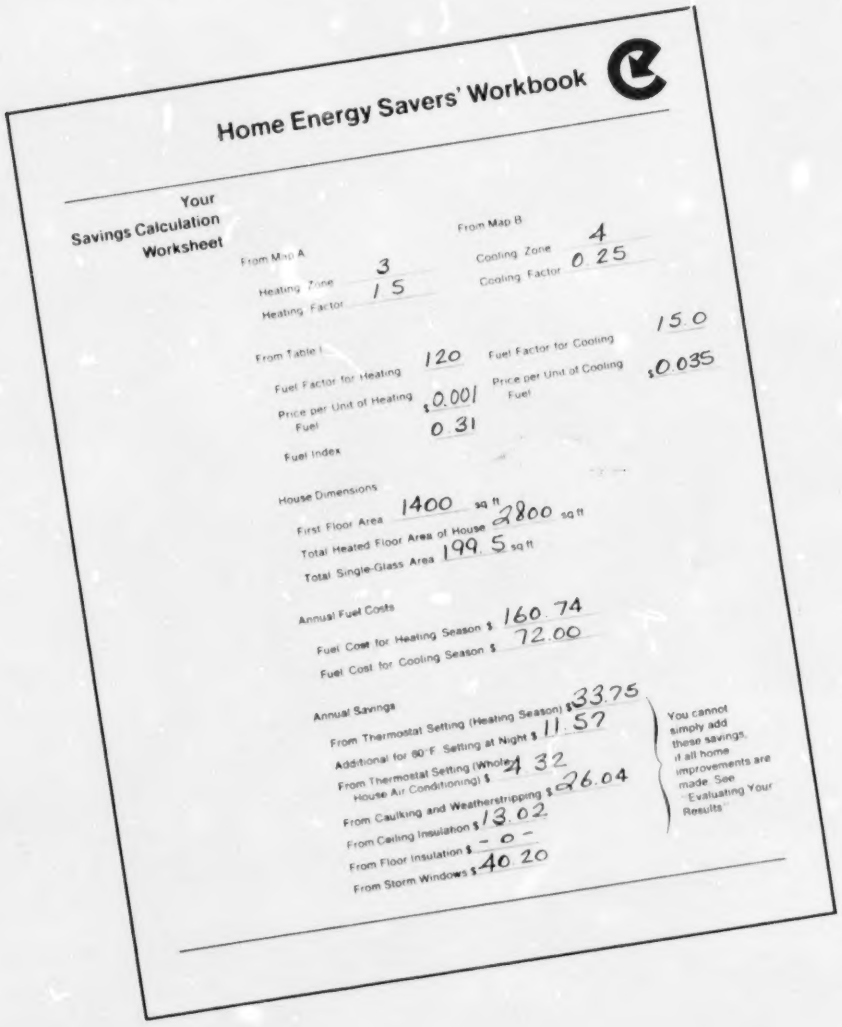
Under 90: You're spending more money than you need to in order to keep your home comfortable. Check the quiz again to see where you lost the most points. That's where you can make the greatest savings in your annual fuel bill, while improving the comfort, appearance, and resale value of your home as well.

How Much Money Can You Save?

This workbook contains some simple calculations that will tell you approximately how much. These calculations are based on average housing, fuel, and climate conditions for your area. If your house is unusual in construction or location, you may want some additional advice before making your calculations. If so, please call your State Energy Office. People who are familiar with your area and conditions will be available to help you.

A Few Basic Numbers

Before you begin to calculate the money you can save on your annual fuel bill, you'll need some numbers to work with. To make your calculations easier, tear out "Your Savings Calculation Worksheet" at the back of the workbook now, and record these basic numbers as described in the following sections. An example of a complete Savings Calculation Worksheet is shown here.



Home Energy Savers' Workbook

Your Savings Calculation Worksheet

From Map A
Heating Zone 3
Heating Factor 1.5

From Map B
Cooling Zone 4
Cooling Factor 0.25

From Table I
Fuel Factor for Heating 120
Price per Unit of Heating Fuel $0.001
Fuel Index 0.31

Fuel Factor for Cooling 150
Price per Unit of Cooling Fuel $0.035

House Dimensions
First Floor Area 1400 sq ft
Total Heated Floor Area of House 2800 sq ft
Total Single-Glass Area 199.5 sq ft

Annual Fuel Costs
Fuel Cost for Heating Season $ 160.74
Fuel Cost for Cooling Season $ 72.00

Annual Savings
From Thermostat Setting (Heating Season) $ 33.75
Additional for 60°F Setting at Night $ 11.57
From Thermostat Setting (Whole House Air Conditioning) $ 21.32
From Caulking and Weatherstripping $ 26.04
From Ceiling Insulation $ 13.02
From Floor Insulation $ - 0 -
From Storm Windows $ 40.20

You cannot simply add these savings if all home improvements are made. See "Evaluating Your Results."

Map A: Heating Zones and Factors

Heating	
Zone	Factor
0	0.0
1	.5
2	1.0
3	1.5
4	2.0
5	2.5

Which heating zone are you in?
What is your heating factor?

Map B: Cooling Zones and Factors

Cooling	
Zone	Factor
1	1.0
2	.75
3	.5
4	.25
5	.0

Which cooling zone are you in?
What is your cooling factor?

Heating and Cooling Factors

First, determine your heating and cooling factors. These numbers indicate the amount of heating and cooling required for different parts of the country. The maps and tables on page 5 will show you the approximate heating and cooling factors for your area. More precise information for your particular community may be provided to you by your State Energy Office. It is very important that you do not confuse the two separate figures for heating and cooling. From Map A, record on your Savings Calculation Worksheet (p. 29) your *Heating* Zone and *Heating* Factor. From Map B, record your *Cooling* Zone and *Cooling* Factor. For example, if you live in Columbus, Ohio, you are in Heating Zone 3 and your Heating Factor is 1.5; you are also in Cooling Zone 4 and your Cooling Factor is 0.25.

If you live on the border between two zones, choose the zone that better represents your climate.

Next look at Table 1. Circle in Column A the type of fuel you use for heating. Then go to Column B and circle your *fuel factor for heating*. If you have whole-house air conditioning, go back to Column A and circle the type of fuel you use for cooling. Now go to Column C and circle your *fuel factor for cooling*. Now fill in Column D. Your State Energy Office may have provided you with fuel costs for your community. Otherwise, if you're not sure how much you pay for fuel, call your fuel dealer or utility, check your latest fuel bill, or call your State Energy Office.

TABLE 1

Fuel Factors for Various Fuels

A Fuel	B Fuel Factor for Heating	C Fuel Factor for Cooling	D Price Per Unit
Oil	1.0	—	$ 0. /gal
Gas			
(cu ft)	120.0	150.0	$ 0. /cu ft
(by therm or 100 cu ft)	1.2	1.5	$. /therm
Electricity	30.0*	15.0	$ 0 /kWh
Wood	.01	—	$. /cord
Propane, LPG, Bottled Gas			
(cu ft)	50.0	60.0	$ 0. /cu ft
(lb)	6.0	7.0	$. /lb
(gal)	1.3	1.5	$. /gal
Coal	.006	—	$. /ton

* If you heat with a heat pump, divide this factor by 2.

Record your fuel factors and price on your Savings Calculation Worksheet.

Your Fuel Index

The next basic number you will need is your Fuel Index. The nine steps below will help you determine that number.

For Heating

If you live in Heating Zone 0, skip Steps 1 through 4 and insert 0 for your heating index in Step 9. If you live in Heating Zones 1 through 5, begin with Step 1.

1. Read your heating factor from your Savings Calculation Worksheet and enter below.
2. Enter your fuel factor for heating.
3. Enter the price you pay per unit of heating fuel.
4. Multiply to get your *heating index*.

_____ × _____ × $ _____ = _____

heating factor | fuel factor | fuel price per unit | heating index

For Cooling

If you live in Cooling Zone 5 or if you do not have whole-house air conditioning, or if you have evaporative cooling (such as a swamp cooler), skip Steps 5 through 8 and insert 0 for your cooling index in Step 9. If you do have whole-house air conditioning and live in Cooling Zones 1 through 4, proceed with Step 5.

5. Read your cooling factor from your Savings Calculation Worksheet and enter below.
6. Read your fuel factor for cooling and enter below.
7. Enter the price you pay per unit of fuel.
8. Multiply to get your *cooling index*.

_____ × _____ × $ _____ = _____

cooling factor | fuel factor | fuel price per unit | cooling index

9. Add your heating and cooling indexes. Round off to two places and record your Fuel Index on your Savings Calculation Worksheet.

_____ + _____ = ☐

heating index | cooling index | Fuel Index

House Dimensions

Floor Area

For the calculations in this workbook, you will need both the *area of your first floor* and the *total heated floor area of your house*. If you already know these numbers, enter them now on your Savings Calculation Worksheet. (If you heat or cool your basement, include this area in your total floor area.) If you do not know these areas, refer to Appendix A to learn how to calculate them.

Window Area

(If all the windows in your home have storm windows *or* double glazing, you can skip this section.)
How many different sizes of windows do you have with *single* layers of glass?

How many of each size? Do not count your sliding glass doors, and don't count windows that have double glazing or storm windows.

Now measure the height and width of each window size and record them below. Multiply each line to find the total area of each window size; then add all the areas to get your total.

Size 1: _____ (h (ft)) × _____ (w (ft)) × _____ (no. of windows) = _____ sq ft

Size 2: _____ (h (ft)) × _____ (w (ft)) × _____ (no. of windows) = _____ sq ft

Size 3: _____ (h (ft)) × _____ (w (ft)) × _____ (no. of windows) = _____ sq ft

Size 4: _____ (h (ft)) × _____ (w (ft)) × _____ (no. of windows) = _____ sq ft

Use a separate sheet if you have more sizes

From separate sheet = _____ sq ft

Total Single-Glass Area = ☐ sq ft

Make sure you have accounted for all windows and then record your total single-glass area on your Savings Calculation Worksheet.

Annual Fuel Costs

For Heating Season

To determine your energy cost for the heating season, take the total of your heating-fuel bills for the months your heat is on more than it's off. In most areas of the country, the heating months are October through March. If you're not sure how much you pay, call your fuel dealer or utility and ask for copies of your fuel bills for the last 2 years. Record your total fuel cost for the heating season on your Savings Calculation Worksheet.

If you use the same fuel for house heating and for other purposes, such as heating hot water, you must subtract 15 percent of your fuel bill to account for energy used for purposes other than heating. This is shown below.

$ _____ × 0.85 = $ [ ]

heating fuel cost from Savings Calculation Worksheet — annual cost for heating only

(If the fuel you use for heating is used for no other purpose, skip this calculation and go directly to the section entitled "For Cooling Season.")

For Cooling Season

If you have whole-house air conditioning, take the total of your cooling-fuel bills for the months your air conditioning is on more than it's off. Most often, the cooling season is mid-May through mid-September. Record your total fuel cost for the cooling season on your Savings Calculation Worksheet. Since the energy you use for cooling is usually used for other purposes as well, you must subtract 40 percent of your fuel bill to correct for these other purposes. This is shown below:

$ _____ × 0.60 = $ [ ]

cooling fuel cost from Savings Calculation Worksheet — annual cost for cooling only

Now you have all the numbers you will need to determine what your annual savings will be for each conservation action

Calculations for Annual Savings

Annual Savings from Thermostat Settings

You can be comfortable at 65° in winter and 78° in summer as long as you dress appropriately for the seasons. Turning your thermostat down in winter and up in summer to these recommended levels can save you money—up to 15 percent of what you are now paying.

Heating Season Savings

How much money you can save on heating costs depends on the *Heating Zone* you live in and your fuel cost for the heating season.
Now look at Table 2. What is the Savings Factor for your *Heating Zone*?

1. Enter below your savings factor for heating.
2. Enter your annual cost for heating only, as determined under *Annual Fuel Costs—For Heating Season* (p.9).
3. Enter the number of degrees you plan to turn your thermostat down.
4. Multiply to find your heating season savings.

TABLE 2
Thermostat Savings Factors for Heating

Heating Zone	Savings Factor for Heating
1	0.05
2	.04
3	.03
4	.025
5	.02

_____ × [$] × _____ = $ _____
savings factor for heating | annual cost for heating only | degrees turned down | heating season savings

Record your heating season savings from thermostat setting on your Savings Calculation Worksheet.

To save even more of your heating bill, you can turn your thermostat back to 60° at night and use extra blankets or an electric one. Contrary to the old notion, unless you have in-slab radiant heating you *won't* normally use more energy reheating your house in the morning than you will save by lowering the nighttime temperature.

If you want to know how much more you can save by turning your thermostat back at night, compute the added saving below using the number of *additional* degrees you plan to reduce your heat by.

_____ × [$] × _____ × 0.3 = $ _____
savings factor for heating | annual cost for heating only | *additional* degrees turned down at night | additional nighttime heating savings

Cooling Season Savings

1. Enter your annual cooling cost as determined under *Annual Fuel Costs—For Cooling Season* (p.9).
2. Enter the number of degrees you plan to turn your thermostat up.
3. Multiply to find your cooling season savings.

$						$
annual cost for cooling only	×		×	0.02	=	cooling season savings
		degrees turned up				

Record your cooling season savings from thermostat setting on your Savings Calculation Worksheet.

Combined Savings

If you heat your home *and* have whole-house air conditioning, you can find your total potential savings by adding the savings for both heating and cooling.

$		$		$
heating season savings	+	cooling season savings	=	total annual savings

Annual Savings from Caulking and Weatherstripping

Some exchange of air in and out of a house is unavoidable, but excessive movement of air can account for a very large portion of your annual fuel bill. In a well-insulated house, the largest source of energy loss can be the air leaks around windows and doors and through other cracks. Remember the flame test you did on your energy quiz? Installing caulking, weatherstripping, and storm doors and windows are good, easy ways of eliminating any of those drafts you found. They also make it easier to regulate your indoor temperature and generally increase the comfort of your home.

Check your house and compare its condition to the descriptions in Table 3. For each building component, enter in the right-hand column the number above the description that most closely fits your house. Then add all three numbers to get your *draft factor*.

TABLE 3
Draft Factors for Caulking and Weatherstripping

Building Component	0.0	0.01	0.02	Your Numbers
Windows *	Windows with good fit.	Moderate fit on regular windows, but with some leakage.	Loose fit on regular windows, drafty.	
Doors	Good fit on doors.	Moderate fit on doors, but with some leakage.	Poor fit on doors, drafty.	
General Condition	Caulking and weatherstripping in good condition.	Caulking and weatherstripping need repair.	No caulking or weatherstripping.	
			Total Draft Factor	

* For a closer look at your savings just for storm windows, see the section entitled *Annual Savings from Storm Windows*.

1. Enter your total draft factor below.
2. Enter your *total house floor area* (from Savings Calculation Worksheet).
3. Enter your fuel index (from Savings Calculation Worksheet).
4. Multiply to get your annual savings.

	×		×		=	$	
draft factor		total house floor area		fuel index		annual savings	

Annual Savings from Ceiling and Floor Insulation

Heat passes through ceiling and floors from the warm side to the cold side. Approximately 30 percent of residential heat loss and gain can occur through the ceiling of the average house and about 8 percent through the floor. Insulation cuts down on the flow of heat and saves you money on your heating and cooling bills. How effective insulation is depends on its resistance to heat flow—its *R-value*—rather than just on its thickness. The larger the R-value, the more effective it will be.

Check the thickness and kind of insulation you now have above your ceiling and under your first floor (in a home with a heated and/or air conditioned basement, floor insulation is not appropriate). If you're not sure what kind you have check the descriptions in the section entitled *Materials and Installation Techniques.*

Now look at Table 4. Circle the kind of insulation you have in your ceiling. Then read down and circle its thickness. The R-value of your insulation is at the left. Enter it in the blank space below labeled "R-Values"—"Ceiling" in the row entitled "Now Have." Do the same for the floor. If you have less than R-11 or none at all, be sure to indicate so.

TABLE 4
R-Values for Various Thickness of Insulation

	BATTS OR BLANKETS		LOOSE FILL (POURED-IN)			
	glass fiber	rock wool	glass fiber	rock wool	cellulosic fiber	
R-11	3½"-4"	3"	5"	4"	3"	R-11
R-13	4"	4½"	6"	4½"	3½"	R-13
R-19	6"-6½"	5¼"	8"-9"	6"-7"	5"	R-19
R-22	6½"	6"	10"	7"-8"	6"	R-22
R-26	8"	8½"	12"	9"	7"-7½"	R-26
R-30	9½"-10½"	9"	13"-14"	10"-11"	8"	R-30
R-33	11"	10"	15"	11"-12"	9"	R-33
R-38	12"-13"	10½"	17"-18"	13"-14"	10"-11"	R-38

Look at Table 5 to see what your R-values *should be.* Check your Savings Calculation Worksheet for your Heating Zone. Enter the recommended R-values for your Heating Zone below the "Now Have" values you just wrote down.

TABLE 5
Recommended Floor and Ceiling Insulation

Heating Zone (Map A)	Recommended for	
	Ceiling	Floor
0,1	R-26	R-11
2	R-26	R-13
3	R-30	R-19
4	R-33	R-22
5	R-38	R-22

	R-Values	
	Ceiling	Floor
Now Have	_____	_____
Recommended	_____	_____

Now find in Table 6 the conduction factors for your present R-values and for the recommended R-values. The difference between the two is your savings index for your ceiling and floor, respectively.

TABLE 6

Conduction Factors for Insulation

R-Value	None	Less Than R-11		R-11	R-13	R-19	R-22	R-26	R-30	R-38
		1"	2"							
Conduction Factor	0.500	0.200	0.120	0.077	0.066	0.048	0.042	0.036	0.031	0.025

	Ceiling	Floor
Conduction Factors for R-Values You Now Have	_____	_____
Conduction Factors for R-Values Recommended	_____	_____
Subtract for Savings Index		

Annual Savings from Ceiling Insulation

To determine how much money you can save by installing insulation in your attic:

1. Enter your savings index for ceiling.
2. Enter your first floor area from your Savings Calculation Worksheet.
3. Enter your fuel index from your Savings Calculation Worksheet.
4. Multiply to find your annual savings.

_____ ×	_____ ×	_____ =	$ _____
ceiling savings index	first floor area	fuel index	annual savings

Record your annual savings from additional ceiling insulation on your Savings Calculation Worksheet.

Annual Savings from Floor Insulation

If your basement is heated or air conditioned, you don't need insulation under your first floor. Skip this section. If the basement or crawl space under your first floor is *not* heated or air conditioned, you can determine your potential savings by doing the following. First, look up your floor factor in Table 7 and then proceed with Steps 1 through 5.

TABLE 7

Floor Factors

Foundation Characteristics	Factor	Foundation Characteristics	Factor
Building with tight crawl space	0.5	More than 2 ft of basement wall exposed above grade (basement unheated)	0.8
Building with tight basement (unheated)	.5	Crawl space skirted	.8
Stone wall basement (unheated)	.8	Building on posts or pillars with no skirts below floor	1.0

1. Enter your floor factor below.
2. Enter your savings index for floor.
3. Enter your *first floor area* (from Savings Calculation Worksheet).
4. Enter your fuel index (from Savings Calculation Worksheet).
5. Multiply to find your annual savings.

_____	×	_____	×	_____	×	_____	= $ _____
floor factor		floor savings index		floor area		fuel index	annual savings

Record your annual savings from floor insulation on your Savings Calculation Worksheet.

Annual Savings from Storm Windows

Heat passes easily and quickly through a single pane of glass. Installing storm windows can cut heat loss and gain in half by adding a "blanket" of still air between the windows. Storm windows will also make it less chilly or hot near the window and reduce drafts.

To determine the savings on your annual fuel bill if you install storm windows over your single-glass windows:

1. Enter the area of your single-glass windows (from the Savings Calculation Worksheet).
2. Enter your fuel index (from the Savings Calculation Worksheet).
3. Multiply to get your annual savings.

_____	×	_____	×	0.65	=	$ _____
single-glass area		fuel index				annual savings

Record your annual savings on your Savings Calculation Worksheet.

Evaluating Your Results

Your Savings Calculation Worksheet now indicates the approximate fuel dollar savings you could achieve by five separate actions, based upon average housing conditions in your area. Note, however, that if you take all the actions indicated, your total savings will not necessarily equal the sum of the five individual savings. For example, storm windows and storm doors provide some of the benefits of weatherstripping. Also, your savings due to additional insulation will be a function somewhat of your thermostat settings. Finally, your actual savings will vary from year to year depending upon the severity of the weather and the current cost of fuel.

Now that you know your savings potential for each conservation action, the next step is to do something that will help you save money. The choice of energy conservation improvements is, of course, up to you. Certain no-cost or low-cost measures, such as adjusting your thermostat, caulking or weatherstripping, will usually pay for themselves very quickly. Before deciding to install insulation or storm windows, you may want to contact your State Energy Office to obtain price information. This will help you determine how wise an investment these improvements will be. For detailed instructions and advice you will want for your own house, you can also talk to one or more of the following:

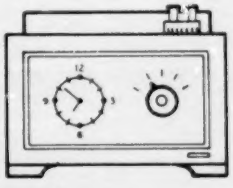
Hardware Store
Building Supply Store
Utility Company
Fuel Dealer
Contractors

The next section will tell you a little bit about some of the materials and installation techniques for each action. There is also a section in the back of this book with suggestions on how to choose a contractor.

Materials and Installation Techniques

Thermostats

To save money on your heating bill, you may want to turn your thermostat back to 60° or 55° at night. A convenient way to be sure you do this each night is to install a clock thermostat. It will automatically turn your thermostat down every night and turn it up in the morning before you get up. You won't be uncomfortable with the temperature—or with your heating bill.



Caulking and Weatherstripping

Materials

Caulking and weatherstripping come in a variety of qualities, costs, and configurations. You should buy, whenever possible, the best quality available. The more durable materials are the best money savers. They perform better and don't need to be replaced as often. Check below for a brief description of the most commonly available materials.

Caulking compounds

1. Not very durable but lowest in cost: oil or resin based.
2. More durable and more expensive: latex, butyl, or polyvinyl.
3. Most durable and most expensive: elastomeric base.

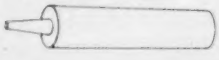
Filler

Material used to fill extra wide cracks: oakum, caulking cotton, glass fiber. Apply caulking compound *after* using filler.

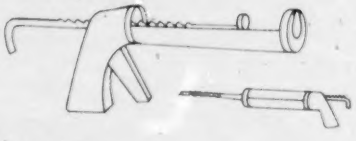
Weatherstripping

1. Inexpensive, easy to install, not very durable: felt or foam strip.
2. More expensive, easy to install, durable: rolled vinyl (with or without various backings).
3. More expensive, somewhat difficult to install, very durable: thin spring metal.
4. Most expensive, very difficult to install, excellent weather seal, durable: interlocking metal channels.

Cartridge

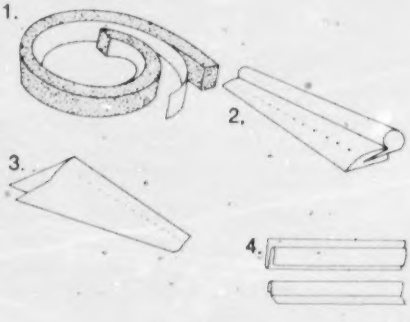


Caulking Gun



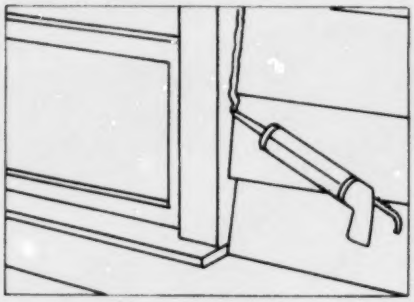
Filler

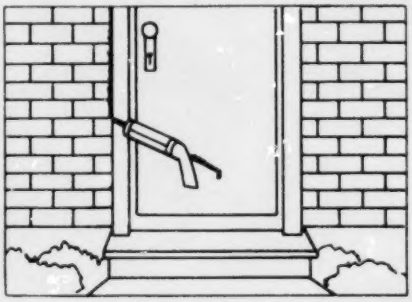
Weatherstripping



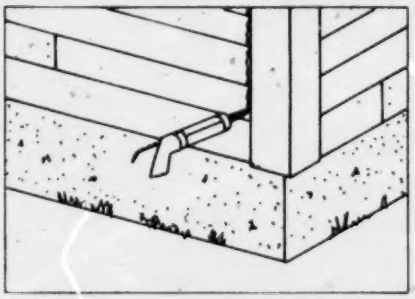
Installation

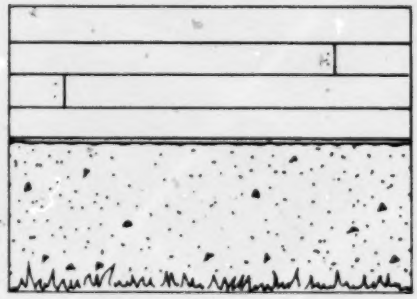
Caulking should be applied outside around window and door frames . . .

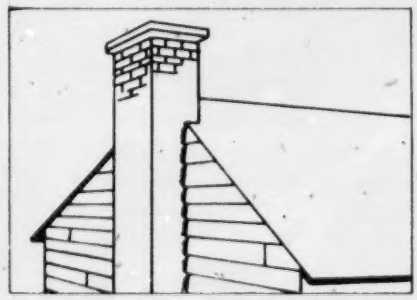


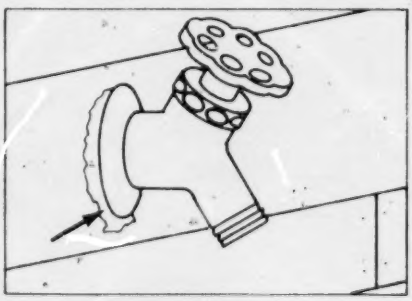


. . . . and wherever else two different materials or parts of the house meet.



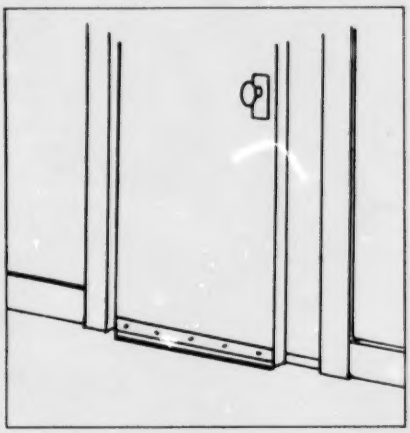


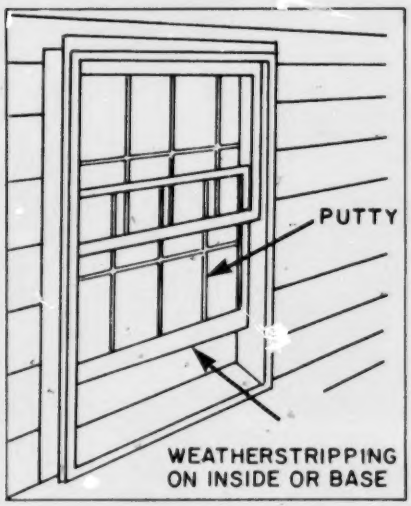




Weatherstripping should be applied around the perimeter of all exterior doors and on the inside of all window sashes.

And while you're at it, check to see if the putty on your windows needs replacing. Cutting down on *all* drafts will make your house much more comfortable year round.





Insulation

Several kinds of insulation are available to homeowners. Kinds that are easily installed by the do-it-yourselfer are batts, blankets, and loose fill. Foamed-in plastic is usually installed by a contractor because special equipment is used. If your house has a flat roof or a mansard roof, or if your attic or basement area is otherwise restricted, installation will be difficult and you may need to hire a contractor. (See the next section, "Where to Get Help.")

Materials

Batt or Blanket

This type of insulation is usually made of glass fiber or rock wool. Batts come in packs of several pieces cut to 4-foot or 8-foot lengths; blankets come in rolls of varying length. Both are sold in widths of 15 inches or 23 inches to fit conventional framing spaces and in thicknesses of 1 to 7 inches. Batts and blankets are available with or without vapor barriers.

Loose Fill

Loose fill insulation is made from glass fiber, rock wool, treated cellulose, vermiculite, or perlite and does not come with a vapor barrier. Loose fill tends to settle in time.

Rock wool should meet Federal Specification HH-I-1030A.

Cellulose is made from recycled newspaper and has a high insulative value. In order for it to be fire resistant, it must be properly treated. Two specifications which certify that cellulose is fire resistant are: Federal Specification HH-I-515C and Underwriters Laboratories Classification listing Type II 26 through 50.

Foam

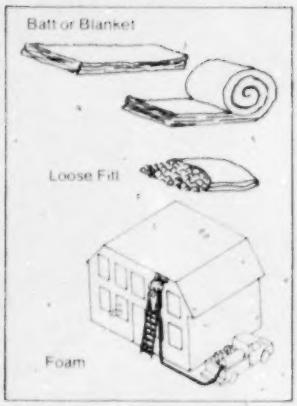
Cellular plastic products may be purchased as either pre-foamed sheets or batts or may be foamed in place by contractors using specialized equipment. The insulating efficiency varies for foams made of different materials (polystyrene, polyurethane, urea-formaldehyde, and others) and should be carefully discussed with the vendor before purchase. Foams also possess other properties which may affect their long-term insulating value, such as moisture retention, shrinkage, spontaneous decomposition, and vermin resistance.

Foams also burn, producing smoke and poisonous gases such as carbon monoxide. These hazards can be reduced by following the recommended installation procedures for each type of foam. Foam that is properly installed will have a higher insulating value.

Installation

Attics

To insulate an attic floor where there is *no* insulation, lay batts or blankets or pour loose fill between the joists. So that moisture from the living areas of your house does not penetrate the insulation and reduce its effectiveness, a vapor barrier must be placed between the heated or air conditioned part of your house and your attic.



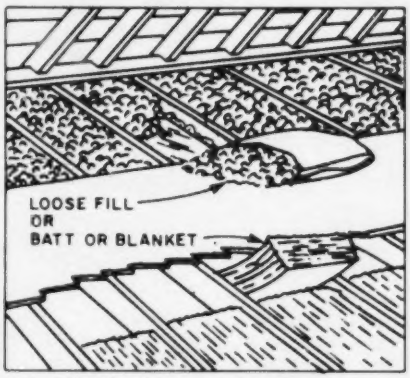
Batts and blankets can be purchased with a vapor barrier on one side. To install, place the vapor barrier face down toward the heated or air conditioned portion of your house so that when it is installed you will no longer see it. If you are using loose fill you will have to install your own vapor barrier. A plastic sheet or polyethylene film should be stapled or tacked *under* the area where you are planning to pour loose fill.

If some insulation already *exists* and you are adding a layer of new insulation on top of the old, it is important that there be *no* vapor barrier between the new and the old. If insulation without vapor barrier is not available, use a vapor barrier type but remove the vapor barrier or slash it freely with a knife and install the insulation with the slashed surface face down. Before purchasing the additional insulation you need, measure the thickness that your attic will accommodate. Additional batts or blankets may not fit! If you try to squeeze insulation in, you'll reduce its effectiveness. Instead, add insulation with a higher R-value per inch.

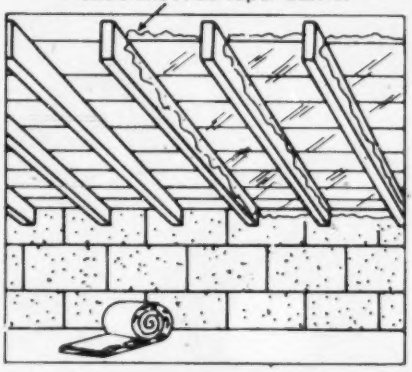
Do not insulate on top of recessed lighting fixtures or heat-producing equipment. Keep the insulation at least three inches away from the sides of these types of fixtures. Also, do not cover eave vents with insulation. Be sure that there is sufficent attic ventilation to allow moisture to escape.

Floors

To insulate the floor above your basement or crawl space, push batts or blankets between the floor joists from below with the vapor barrier facing up towards the heated or air conditioned part of your house. If there is no vapor

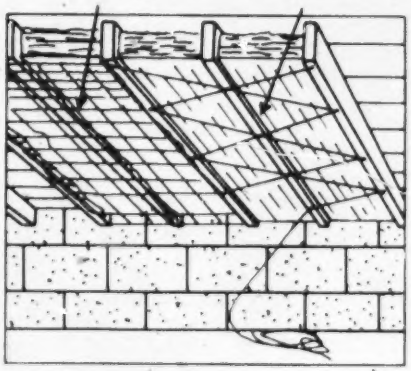


Plastic sheet as vapor barrier



Lightweight fencing for retention

Wire lacing for retention



barrier, install a plastic sheet against the underside of your floor as shown.

To support the insulation, lace wire back and forth between nails spaced 2 feet apart on the bottom of the floor joists or tack chicken wire or other lightweight fencing to the joists. Provide adequate ventilation below the floor in crawl space to allow moisture to escape.

Storm Windows

Storm windows vary widely in design, durability, ease of use, and cost. They range from temporary plastic sheets to custom-made permanent installations, but basically there are two kinds: single and combination.

Materials

Single Storm Windows

Single storm windows can be made of plastic sheet, glass, or rigid plastic. Plastic sheet is fairly inexpensive initially, but it is easily damaged and must be replaced often. Single glass or rigid plastic is more durable and can be used year after year.

Combination Storm Windows

These installations consist of storm windows and screens and are intended to be fixed permanently over double-hung windows. Combination windows come in a variety of finishes and qualities. Shop around for good quality.

Installation

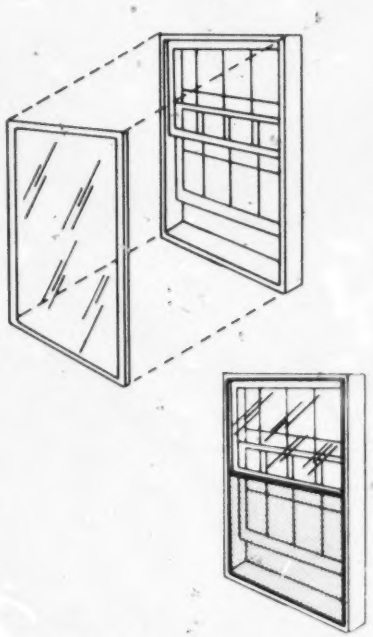
Single Storm Windows

You can make and install your own single storm windows. For plastic sheet, use wood strips to tack the plastic to the outer edge of the frame; trim off any plastic showing around the outside of the wood strips to stop the wind from lifting and tearing the plastic. Do-it-yourself aluminum molding kits and glass are available from the local hardware store, if you want to make your own. If you have them made by a local supplier, give him the exact measurements you want for the finished window. Remember to leave a margin around the outside window frame for the clips that will hold the window in place.

Combination Storm Windows

These can be installed by a contractor who will do the measuring for you—or you can do the job yourself if you're handy.

If you need help in choosing a contractor or are looking for financial assistance, see the next section.



Where to Get Help

Choosing a Contractor

If you decide that a particular home improvement you want to make should be done by a contractor, read the following suggestions for finding the right person to do the job.

Where to Look

Check the Yellow Pages of your telephone directory under "Insulation Contractors—Cold and Heat" or other headings defining the job you want done. Check with your fuel supplier or electric utility company for suggestions. Consult friends and neighbors. Check your lending agency, who may have had experience in supplying loans for similar purposes. From these sources, establish a list of three or four contractors from which to select.

How to Select

Ask each contractor for a list of past customers and check to see if he has done satisfactory work. Check your contractor's reliability with the local Better Business Bureau (also listed in the Yellow Pages), or ask a bank or credit agency to check his credit rating. Give all the contractors the same outline of the job you want done. Be specific and don't change your job description for particular contractors. Ask each one to quote on the same job. Then select the contractor who offers you what you're looking for.

After You Have Selected a Contractor

Have him write up a specific contract for your job. Check the contract carefully for the work he is to do and make sure that it is what you want done. Ask the contractor about the insurance he carries. Does he have insurance to protect his workmen if they are injured? Are you covered if one of his workmen damages your house? Sign the contract only when you are fully satisfied that it includes everything you want done. Insisting on a contract doesn't mean that you don't trust the contractor. A contract should outline the responsibilities of both parties so that they are fully understood before the work begins.

Getting Financing

There are many kinds of financing you may want to investigate. Among them is a home improvement loan or an FHA/HUD Title I loan. On Title I loans, lenders are not allowed to charge fees. Both kinds of loans should be available from

Savings and Loan Institutions
Commercial Banks
Credit Unions.

Low-income and fixed-income people may be eligible for assistance under the Weatherization Act. Your State Energy Office or local Community Action Agency can tell you if you're in doubt. You should also call your State Energy Office to ask whether there are any other special financing programs for which you are eligible.

Tips for Saving More Energy

Two obvious places to save energy in your home are your heater/air conditioner and your hot water heater. Having your furnace serviced once a year could save you up to 10 percent of your current fuel use. Cleaning the filters on hot air furnaces and air conditioners and closing off unoccupied rooms can save you even more.

Look at all the ways you use hot water and think of how much money it costs you. If yours is a typical home, the energy you use for hot water is the second largest item on your fuel bill. If you want to make a large savings:

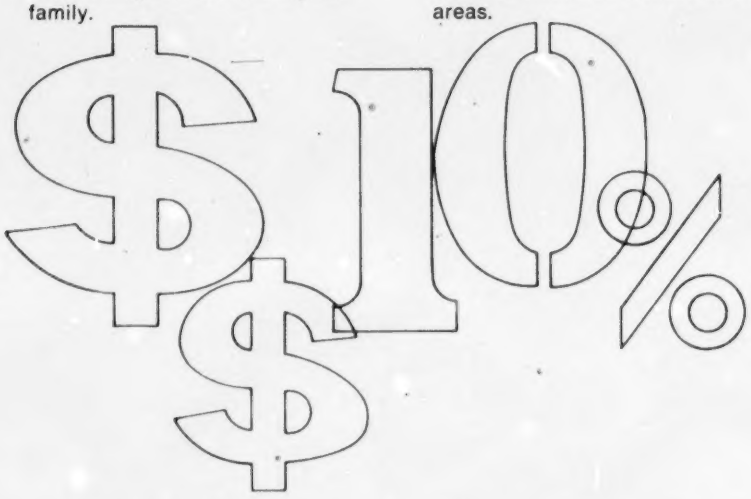
- Repair leaky faucets and install flow restrictors on all faucets and shower heads.
- Be sure appliances using hot water—particularly dishwasher and clothes washer—are full, but not overloaded, before you use them.
- Use cold water, rather than hot, whenever you can.
- Turn down the thermostat on your hot water heater as far as you can to comfortably accommodate your family.

You can reduce summer energy load by turning off your air conditioner at night or during cool periods and taking advantage of natural ventilation or power fans. For instance, if you open the space between the attic and living quarters during these cool periods and turn on your attic fan, it will pull out heat which built up during the day. In the same way, a fan in an upstairs window can distribute cool evening air throughout the house as long as other windows are open.

Another important consideration in reducing your energy load is providing sufficient ventilation in unfinished attics. A 1,400 square foot attic, for instance, should have at least 5 square feet of ventilation.

A great deal of energy can be lost through your chimney if you leave the damper open when your fireplace is not being used.

If you want to save additional energy, seal and insulate ductwork in unheated areas.



Notes

Appendix A:

How to Calculate Your First Floor Area and Heated Living Area

If your house most closely resembles a sketch in Row A or Row C, then it's basically a rectangle and the area of your *first floor* is simply the length times the width. The *total floor area of your house* is the first floor area times the number of stories you have. If your basement is heated, it should be counted as a story. Unheated basements should *not* be counted.

_____	×	_____	=	[ ]	×	_____	=	[ ]
l (ft)		w (ft)		first floor area		no. of stories		total house floor area

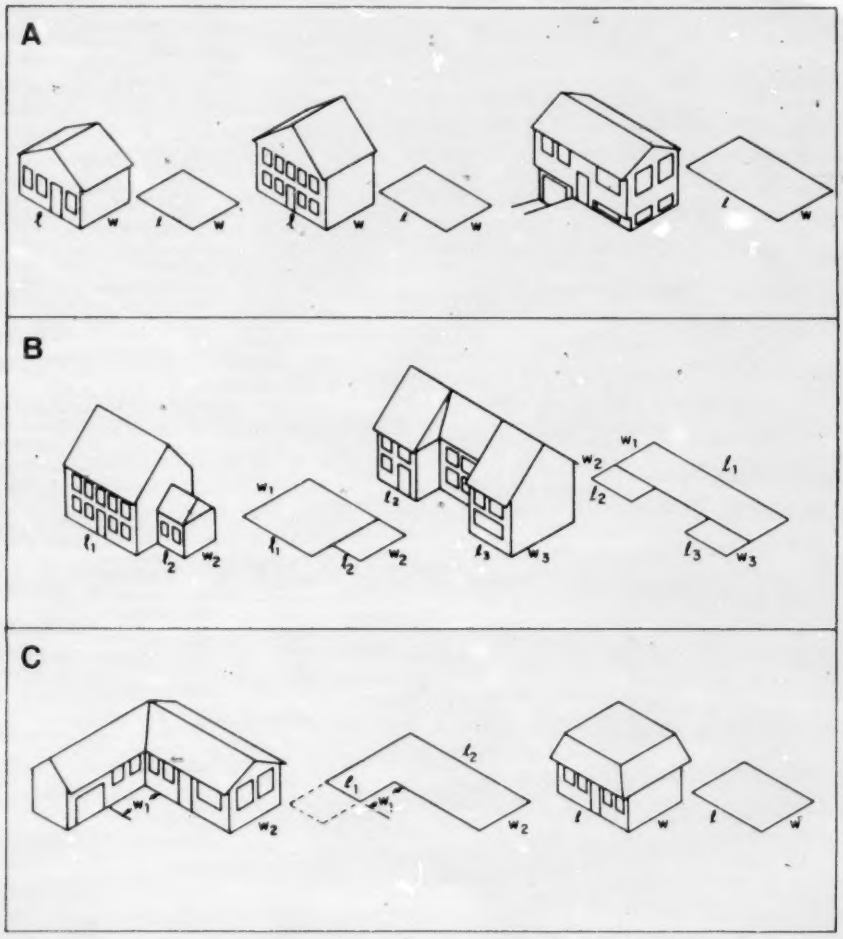
If your house most closely resembles a sketch in Row B, then divide the floor area, as shown, into separate rectangles and add the areas of each to get the *first floor area*. For each rectangle having more than one story, multiply by the number of stories and then add to get your *total house floor area.*

1. _____ (l_1 (ft)) × _____ (w_1 (ft)) = _____ sq ft × _____ (no. of stories) = _____ sq ft
2. _____ (l_2 (ft)) × _____ (w_2 (ft)) = _____ sq ft × _____ (no. of stories) = _____ sq ft
3. _____ (l_3 (ft)) × _____ (w_3 (ft)) = _____ sq ft × _____ (no. of stories) = _____ sq ft

First Floor Area = [ ] sq ft Total House Floor Area = [ ] sq ft

Record both your first floor area and your total house area on your Savings Calculation Worksheet.

What Does Your House Look Like?



Notes

Your Savings Calculation Worksheet

From Map A:

Heating Zone _____

Heating Factor _____

From Map B:

Cooling Zone _____

Cooling Factor _____

From Table I:

Fuel Factor for Heating _____

Price per Unit of Heating Fuel $_____

Fuel Index _____

Fuel Factor for Cooling _____

Price per Unit of Cooling Fuel $_____

House Dimensions

First Floor Area _____ sq ft

Total Heated Floor Area of House _____ sq ft

Total Single-Glass Area _____ sq ft

Annual Fuel Costs

Fuel Cost for Heating Season $_____

Fuel Cost for Cooling Season $_____

Annual Savings

From Thermostat Setting (Heating Season) $_____

Additional for 60° F. Setting at Night $_____

From Thermostat Setting (Whole-House Air Conditioning) $_____

From Caulking and Weatherstripping $_____

From Ceiling Insulation $_____

From Floor Insulation $_____

From Storm Windows $_____

You cannot simply add these savings, if all home improvements are made. See "Evaluating Your Results."

Energy Conservation Now

Federal Energy Administration

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